CLAIMS

1. A hologram record carrier having a substrate and a reflective layer, wherein recording or reproducing of information is performed by light irradiation, characterized by comprising:

a holographic recording layer that reserves an optical interference pattern comprising components of coherent reference light and signal light as a diffractive grating therein; and

a two-dimensional recording layer that is laminated in a film thickness direction of the holographic recording layer and whose physical property changes in response to light intensity.

2. The hologram record carrier according to claim 1, wherein the optical interference pattern is produced by a first light beam so that a hologram is recorded, and the two-dimensional recording layer senses a second light beam so that a mark is recorded according to change of the physical property.

3. The hologram record carrier according to claim 2, wherein the holographic recording layer has a sensitivity to a wavelength of the first light beam higher than that to a wavelength of the second light beam, and the two-dimensional recording layer is a phase-change film, a pigmented coat, or a magneto-optical recording film where a sensitivity to a wavelength of the second light beam is set to be higher than a sensitivity to a wavelength of the first light beam.

4. The hologram record carrier according to any one of claims 1 to 3, wherein the two-dimensional recording layer is disposed between the holographic recording layer and the reflective layer.

5. The hologram record carrier according to any one of claims 1 to 4, wherein the two-dimensional recording layer is dispose on a side of a light irradiation face of the holographic recording layer.

6. The hologram record carrier according to any one of claims 1 to 5, wherein an end mark indicating an end of the hologram or a group of the holograms recorded on the holographic recording layer is recorded at a portion of the two-dimensional recording layer laminated on a portion of the holographic recording layer recorded with the hologram or the group of the holograms.

7. The hologram record carrier according to any one of claims 1 to 5, wherein an address mark indicating an address of the hologram or a group of the holograms recorded on the holographic recording layer is recorded at a portion of the two-dimensional recording layer laminated on a portion of the holographic recording layer recorded with the hologram or the group of the holograms.

8. The hologram record carrier according to any one of claims 1 to 5, wherein a relational mark indicating information relating to the hologram or a group of the holograms recorded on the holographic recording layer is recorded at a portion of the

two-dimensional recording layer laminated on a portion of the holographic recording layer recorded with the hologram or the group of the holograms.

9. The hologram record carrier according to any one of claims 1 to 8, wherein the reflective layer has tracks extending such that they separate from each other without crossing one another for tracking a spot of the light beam that passes from the objective lens through the holographic recording layer and the two-dimensional recording layer to be focused.

10. The hologram record carrier according to any one of claims 1 to 9, wherein the tracks are formed spirally, in a spiral arc shape, or concentrically.

11. The hologram record carrier according to any one of claims 1 to 10, wherein the tracks are formed in parallel.

12. A hologram apparatus of a hologram record carrier having a substrate, a reflective layer, a holographic recording layer that reserves an optical interference pattern comprising components of coherent reference light and signal light as a diffractive grating therein, and a two-dimensional recording layer that is laminated in a film thickness direction of the holographic recording layer and whose physical property changes in response to light intensity, where recording or reproducing information of a diffractive grating is performed by light

irradiation, characterized by comprising:

servo control for causing a light beam to track movement of the hologram record carrier is performed by focusing the light beam on the two-dimensional recording layer to detect returning light of the light beam, and recording or reproducing of a mark is performed on the two-dimensional recording layer by the light beam.

13. The hologram apparatus according to claim 12, further comprising first and second light source, first and second drive circuits that supply data to be recorded on the holographic recording layer and the two-dimensional recording layer to the first and second light sources, respectively, and an optical system including an objective lens that irradiates the light beams from the first and second light sources on the hologram record carrier approximately coaxially and supplies returning light from the hologram record carrier to a corresponding detecting unit, wherein the optical interference pattern is produced by a light beam from the first light source so that a hologram is recorded, and the two-dimensional recording layer senses a light beam from the second light source so that a mark is recorded according to change of the physical property.

14. The hologram apparatus according to claim 13, wherein the optical system includes a spatial light modulator that produces signal light by modulating a light beam from the first light source as reference light in response to record information spatially,

and an optical system for merging the reference light and the signal light approximately coaxially is provided.

15. The hologram apparatus according to any one of claims 12 to 14, wherein an end mark indicating an end of the hologram or a group of the holograms to be recorded on the holographic recording layer is recorded at a portion of the two-dimensional recording layer laminated on a portion of the holographic recording layer recorded with the hologram or the group of the holograms as the mark.

16. The hologram apparatus according to any one of claims 12 to 14, wherein an address mark indicating an address of the hologram or a group of the holograms to be recorded on the holographic recording layer is recorded at a portion of the two-dimensional recording layer laminated on a portion of the holographic recording layer recorded with the hologram or the group of the holograms as the mark.

17. The hologram apparatus according to any one of claims 12 to 14, wherein a relational mark indicating information relating to the hologram or a group of the holograms to be recorded on the holographic recording layer is recorded at a portion of the two-dimensional recording layer laminated on a portion of the holographic recording layer recorded with the hologram or the group of the holograms as the mark.

18. A recording method of a hologram record carrier having a substrate, a reflective layer, a holographic recording layer that reserves an optical interference pattern comprising components of coherent reference light and signal light as a diffractive grating therein, and a two-dimensional recording layer that is laminated in a film thickness direction of the holographic recording layer and whose physical property changes in response to light intensity, where recording of information is performed by light irradiation, characterized by comprising:

servo control for causing a light beam to track movement of the hologram record carrier is performed by focusing the light beam on the two-dimensional recording layer to detect returning light of the light beam, and recording of a mark is performed on the two-dimensional recording layer by the light beam.

19. The recording method according to claim 18, wherein the light beam includes first and second light beams irradiated on the hologram record carrier approximately coaxially, and the light interference pattern is produced by the first light beam, and the two-dimensional recording layer senses the second light beam.

20. The recording method according to claim 19, wherein the first light beam is produced by producing signal light by a spatial light modulator that modulates reference light from the first light source spatially according to record information and merging the reference light and the signal light approximately coaxially.

21. The recording method according to any one of claims 18 to 20, wherein an end mark indicating an end of the hologram or a group of the holograms to be recorded on the holographic recording layer is recorded at a portion of the two-dimensional recording layer laminated on a portion of the holographic recording layer recorded with the hologram or the group of the holograms as the mark.

22. The recording method according to any one of claims 18 to 20, wherein an address mark indicating an address of the hologram or a group of the holograms to be recorded on the holographic recording layer is recorded at a portion of the two-dimensional recording layer laminated on a portion of the holographic recording layer recorded with the hologram or the group of the holograms as the mark.

23. The recording method according to any one of claims 18 to 20, wherein a relational mark indicating information relating to the hologram or a group of the holograms to be recorded on the holographic recording layer is recorded at a portion of the two-dimensional recording layer laminated on a portion of the holographic recording layer recorded with the hologram or the group of the holograms as the mark.

24. A reproducing method of a hologram record carrier that comprises a substrate, a reflective layer, a holographic recording layer that reserves an optical interference pattern comprising

components of coherent reference light and signal light as a diffractive grating therein, and a two-dimensional recording layer that is laminated in a film thickness direction of the holographic recording layer and whose physical property changes in response to light intensity, where mark has been recorded on the two-dimensional recording layer by light irradiation, wherein

servo control for causing a light beam to track movement of the hologram record carrier is performed by focusing the light beam on the two-dimensional recording layer to detect returning light of the light beam, and information is reproduced from the mark of the two-dimensional recording layer by the light beam.

25. The reproducing method according to claim 24, wherein the light beam includes first and second light beams irradiated on the hologram record carrier approximately coaxially, information from the light interference pattern is reproduced by the first light beam, and the two-dimensional recording layer senses the second light beam so that information from the two-dimensional recording layer is reproduced by the second light beam.